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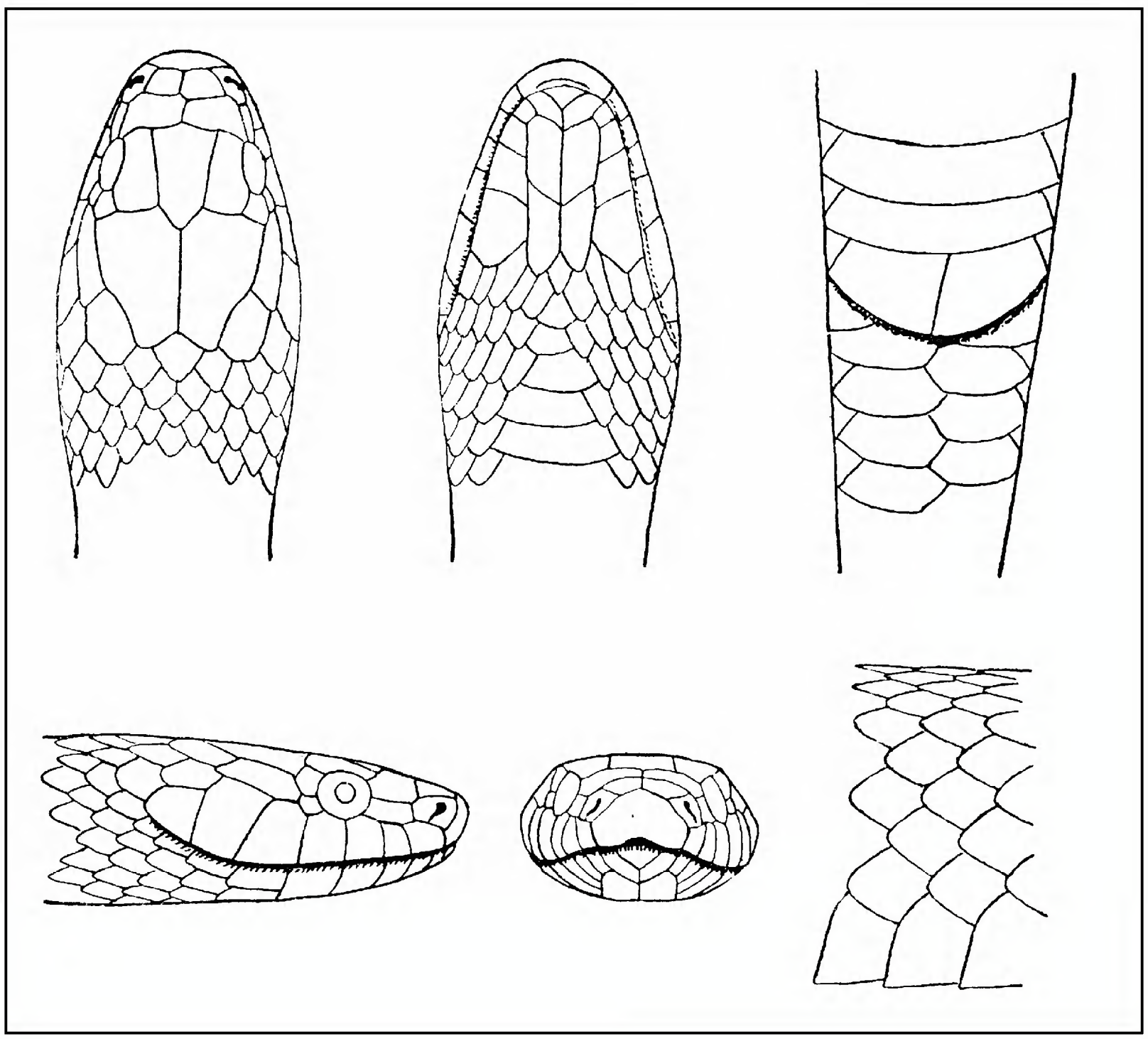

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A Review and Synthesis of Existing Literature on Rainbow Snakes, *Farancia erytrogramma*

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Introduction

Rainbow snakes (*Farancia erytrogramma*) belong to the family Colubridae. While the colubrids are extremely diverse, there are several characteristics all members in the family share including the loss of such primitive features as premaxillary teeth, coronoid bone, pelvic elements, and a functional left lung. Further, the ventrals are almost equal to body diameter and the anterior end of the maxillary bone does not have venom fangs (Dowling, 1959).

The type locality of the first described rainbow snake is not documented. The first definite localities, the Santee and Cooper Rivers in Charleston County, South Carolina, were published in J. E. Holbrook's *North American Herpetology* in 1836. And most accounts agree that it is reasonable to assume that A. M. F. J. Palisot de Beauvois collected the type specimen in the lower Cooper River in Charleston, South Carolina, in 1801 (Harper, 1940; Neill, 1957). Palisot de Beauvois, a French naturalist, originally named the species *Coluber erytrogrammus* (Neill, 1964; Mitchell, 1982b). Following Palisot de Beauvois' original description of the rainbow snake, F. M. Daudin, another French naturalist, conducted further research and re-described the species in 1803 as *Coluber erythrogrammus*, using one of Palisot de Beauvois' specimens (Harper, 1940, Neill,1964).

Mitchell's (1982b) review of the species shows that since rainbow snakes were first described in 1801, the species has been grouped and regrouped 11 times into nine different genera. In 1820, Merrem first changed the genus from *Coluber* to *Natrix*. Between 1820 and 1964 the snake was bounced between the following genera: *Homalopsis* (1827), *Helicops* (1830), *Hydrops* (1842), *Abastor* (1849), *Callopisma* (1853), *Calopisma* (1854), back to *Abastor* (1940), and finally to *Farancia* (1964).

Based on similarities in physical and behavioral characteristics between rainbow snakes and mud snakes (*Farancia abacura*), Neill (1964) synonymized *Abastor* with *Farancia*, thereby establishing the current scientific classification: *Farancia erytrogramma*. A later study of the skulls of *Farancia erytrogramma* and *Farancia abacura* (Cundall and Rossman, 1984) revealed close similarities, further supporting the placement of the two species in the same genus.

The specific epithet *erytrogramma* is derived from the Greek roots *erythros* meaning "red" and *gramma*, which means "writing." The specific name is appropriate and refers to the black coloration surrounding red scales and stripes on the dorsum. There are two subspecies of rainbow snakes: *Farancia e. erytrogramma* and *F. e. seminola*. The standard English names recommended by Crother et al. (2008) for the subspecies are Common Rainbow Snake for *F. e. erytrogramma* and Southern Florida Rainbow Snake for *F. e. seminola*. Moler (1992) mentions Seminole Rainbow Snake as an alternative English name for *F. e. seminola*. The subspecific name *seminola* refers to the geographical area in which the subspecies occurs, which was once inhabited by Seminole Native Americans (Mitchell, 1982b). The genus name, *Farancia*, is New Latin; however its meaning is unknown (Mitchell, 1982a).

Vernacular names for rainbow snakes abound. In some areas they are called "eel moccasins" because their primary prey is American eels, *Anguilla rostrata* (Neill, 1964). Rainbow and mud snakes both are also dubbed "horn snakes." This name refers to the modified spine-like scale at the end of the tail, which is present on both species (Jensen, pers. com., 2005). Other names mentioned by various authors as being used for rainbow snakes include: sand snakes (Richmond, 1945); mud snakes; red-lined snakes, sandhogs, striped wampum, red-lined horned snakes, red-sided snakes (Wright and Wright, 1957) stinging snakes, hoop snakes, thunderbolts (Mount, 1975); red swamp snakes, (Linzey and Clifford, 1981); striped horn snakes (Mitchell, 1994).

Distinguishing Characteristics

Rainbow snakes are heavy-bodied and iridescent. Adult total lengths range between 104 and approximately 168 cm, and hatchlings measure 20–30 cm (Gibbons et al., 1977; www.uga.edu/srelherp, last accessed 28 September 2011). The largest *Farancia e. erytrogramma* on record is 173.3 cm (Mitchell, 1994). In total, three large *Farancia e. seminola* have been reported with the largest of the three measuring 131 cm long (Moler, 1992). Rainbow snakes have smooth scales with three red stripes on a dark dorsum. The mid-dorsal stripe ends at the base of the tail. The lateral stripe on the sixth scale row extends along the dorsal side of the tail. Below the sixth scale row the coloration is generally a violet black or slate blue color. The top of the head is black to slate blue in color, with the scales outlined in red. The underside of the head is yellow, as are the upper and lower labials. Holbrook (1842) stated, "There are seven superior labial plates, increasing in size from before to the sixth; the fourth and fifth complete the inferior wall of the orbit." But some drawings (e.g., Cope, 1900; Schmidt and Davis, 1941; Palmer and Braswell, 1995) and close-up photographs (e.g., Behler and King, 1979; Dorcas, 2004) show the third and fourth supralabials bordering the eye, so that character cannot be invariant. There are two primary rows of black spots located on the venter with a short mid-ventral row of spots, while the tail has only two distinct rows of spots (Mitchell, 1982b). The anal plate is usually divided. The head is short, small, and not very distinct from the neck, as there is no visible difference between the width of the head and the body, which is cylindrical in shape. The posteriodorsal scales are slightly keeled in some specimens. The scale located at the end of the tail forms a sharp

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spine. Males usually have more evident mid-ventral spots than females (Mitchell, 1982b).

On a more subjective note, Haltom (1931) states: "The rainbow snake is one of, if not the, most beautiful species in America. This snake is a thing of beauty, with a most artistic color decoration, of stripes of red and black going the entire length of the body."

Rainbow snakes are sexually dimorphic. Males have proportionately longer tails and have shorter bodies than females, even as juveniles. Adult females reach an average length of 133.5 cm, while adult males grow to an average length of 102 cm. Males also have more ventral spotting and less subcaudal spotting than females (Richmond, 1954; Gibbons et al., 1977).

There are only slight differences between the two subspecies of *Farancia erytrogramma*. The ventrals of *Farancia e. erytrogramma* are primarily red or pink, with black pigment restricted to the two lateral rows and a short midventral row of spots. Scales of the first dorsal row completely lack black pigment, and the scales of the second and third dorsal rows have only a little black on them. The red lateral stripe is not encroached on by black (Mitchell, 1982b). The ventral and subcaudal scutes of *Farancia e. seminola* are largely black and the red pigmentation on the subcaudal scutes surround large black spots. The third scale row is completely black, while scale rows two and three are both half black and the red lateral stripe is bordered in black and has dentate edges (Neill, 1964).

Farancia abacura and *Farancia erytrogramma* are closely related species; however, they rarely share the same ecological niche where their ranges overlap (Neill, 1964). Despite many similarities, the two are readily distinguishable by color pattern and scalation. Mud snakes are uniformly black dorsally—no stripes; their ventral surfaces are red with black checkerboard markings or crossbands. The ventral red coloration is carried up onto the sides of the body forming triangular shapes (Davis, 1948). Rainbow snakes have two internasal scales; mud snakes only one.

Distribution

Farancia e. erytrogramma is found in the coastal plain ecoregion from the Potomac River drainage of Charles County, Maryland (McCauley, 1939) to the north-central region of Florida, and west into eastern Louisiana (Gordon, 1957). Disjunct populations may still exist in Pasco and Pinellas Counties, Florida, but specimens from there have not been seen in some time (Bartlett and Bartlett, 2003). The subspecies has been documented in the coastal plain regions of Maryland, Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, and Louisiana (Figure 1) (McCauley, 1945; Mount, 1975; Ashton and Ashton, 1981; Dundee and Rossman, 1989; Mitchell, 1994; Palmer and Braswell, 1995; Ernst and Ernst, 2003; Jensen et al., 2008).

Farancia e. seminola occurs only in an isolated population in Glades County, Florida (Figure 1). The only known specimens were collected from Fisheating Creek, located 150 miles south of the southernmost *Farancia e. erytrogramma* population in north-central Florida (Moler, 1992).

Abundance Status

Rainbow snakes are rare. John B. Jensen of the Georgia Department of Natural Resources has been studying the species for years and has never seen an individual in the wild (Jensen, pers. com., 2005). The abundance status of rainbow snakes is unknown, although Richmond's (1945) 6-year study of the snake at Shackelford Farms in New Kent County, Virginia, indicated the snake was unusually abundant in the dry, sandy fields of the study site. The number of snakes observed is not included in the article. Holbrook (1836) stated, "This Serpent is by no means uncommon in Carolina. I have often seen it on the banks of the Santee." But Corrington (1929), writing about the herpetology of the Columbia, South Carolina, region stated that the rainbow snake was uncommon in South Carolina and unknown in the piedmont. Gibbons et al. (1977) address the rarity of the rainbow snake, suggesting that collecting techniques that have been used in the past may not be suitable for capturing rainbow snakes, and mention that the publication of only a few papers on the species demonstrates the obvious scarcity.

Farancia e. seminola is state-listed as rare in Florida and the status is undetermined. Only three specimens have been collected and those were caught between 1949 and 1952 (Moler, 1992). No specimens have been observed or collected since then (Ernst and Ernst, 2003). Although no individuals have been caught and identified since 1952, a wildlife technician at surveying Fisheating Creek, located on Fisheating Wildlife Management Area (W.M.A.) said that he saw a colorful snake sitting on the bank eating an American eel early one morning in 1988. Kevin Enge, a herpetologist for the Florida Fish and Wildlife Conservation Commission (F.F.W.C.C.), has no doubt that the Seminole rainbow snake still exists in Fisheating Creek and attributes the lack of documented specimens to the lack of research conducted on the species (Enge, pers. com.). However, on 6 October 2011 the U.S. Fish and Wildlife Service published a finding in the *Federal Register* that the subspecies does not

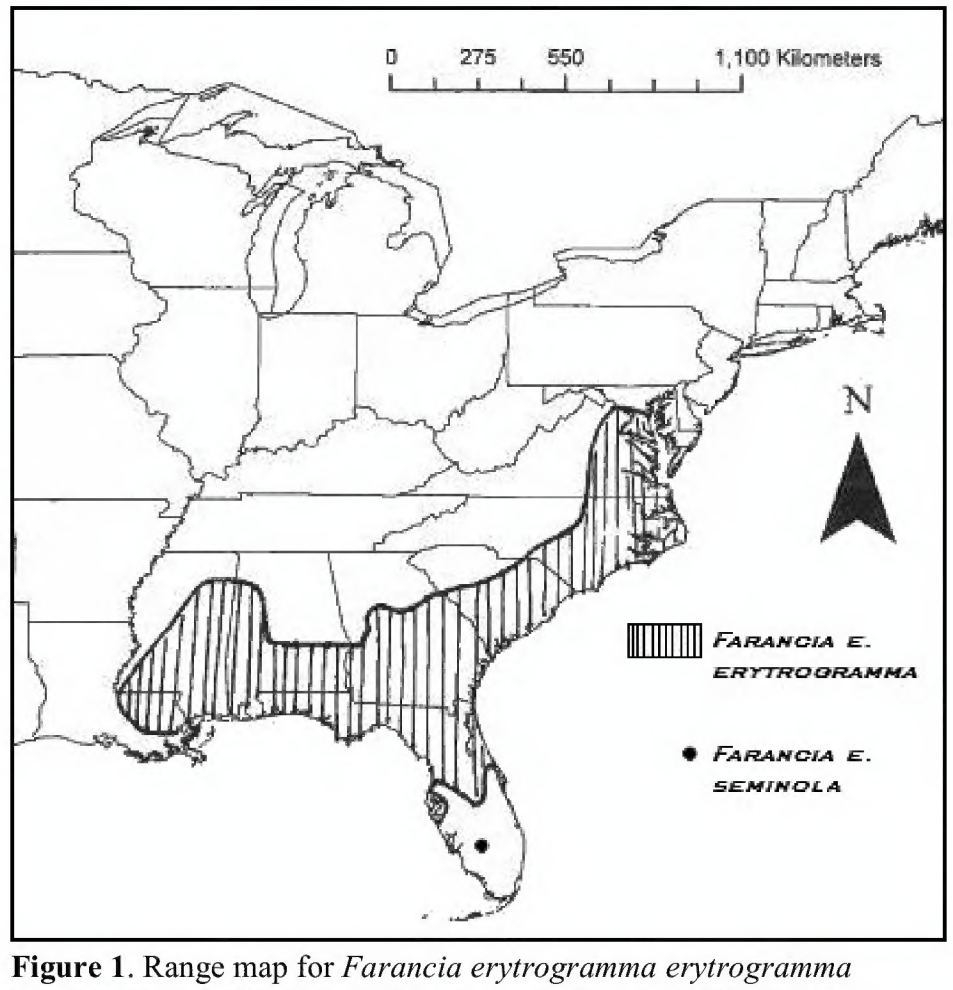

Figure 1. Range map for *Farancia erytrogramma erytrogramma* (striped area) and *Farancia erytrogramma seminola* (black circle).

qualify for protection under the Endangered Species Act (http://www.fws.gov/southeast/news/2011/11-069.html). This finding has criticized by the Center for Biological Diversity as prematurely declaring the subspecies extinct.

Seasonal activity may also affect terrestrial habits of the snakes during different times of the year. Neill (1964) believed the rainbow snakes are not affected by temperature changes as much as other ectothermic vertebrates because the species is restricted to fluvial habitats. Neill's studies indicate individuals are more active in March, June, and October. They are likely more active in March due to searching for a mate and food. And in June, rainbow snakes are more abundant while gravid females are basking. In October, they are more active while looking for food prior to over-wintering (Neill, 1964).

Primary Habitats

Both subspecies of *Farancia erytrogramma* are fossorial and occur only in the coastal plain throughout their range. They predominately live in rivers and streams, but sometimes inhabit swamps, open marshes, and springs (Mitchell, 1982b). The water in which the snake is found is generally moving and clear or with low turbidity (Neill, 1964). *Farancia e. erytrogramma* is most commonly found in various aquatic habitats surrounded by open, sandy fields where the most abundant terrestrial plant is broomsedge bluestem (*Andropogon virginicus*) (Gibbons et al., 1977). *Farancia e. erytrogramma* is known to occur in the tidal swamp forests and bottomland hardwood forest wetlands along the North Carolina coast , where the species inhabits open to dense shrub layers The dominant tree species in this habitat are bald cypress (*Taxodium distichum*), swamp black gum (*Nyssa sylvatica biflora*), and water tupelo (*Nyssa aquatica*) (North Carolina Wildlife Resources Commission, 2005).

The three documented specimens of *Farancia e. seminola* were found in Fisheating Creek, a stream managed by the F.F.W.C.C., surrounded by dry prairies and flatwoods that are interrupted by seepage slopes, flooded farmlands, and sag ponds, bottomland forests and floodplain swamps. Fisheating Creek is located within Fisheating Creek W.M.A. on approximately 7,394 ha (F.F.W.C.C., 2003).

Reproduction

The courtship behavior of rainbow snakes has not been witnessed and is unknown (Wright and Wright, 1957; Jensen, pers. com., 2005). No studies have been done on the reproductive biology of rainbow snakes, but many nests and hatchlings have been found in the wild and many clutches of eggs have been obtained from gravid females held in captivity. Thus, data have been published on timing of egg-laying, clutch sizes, and measurements of eggs and hatchlings (Richmond, 1945, 1954; Anonymous, 1957; Wright and Wright, 1957; Neill, 1964; Gibbons et al., 1977; Palmer and Braswell, 1995; Moulis and Williamson, 1998). These data can be summarized as follows: egg-laying from 30 June to 14 August; nests in sandy soil to depths of 20–25 cm; hatching in September or early October; eggs 25.8–40.0 mm long × 14.7–27.0 mm wide; hatchlings' total length 14.3–28.0 cm, weight 3.6–8.7 g (Ernst and Ernst, 2003).

Hatchlings have been found in the fall burrowing through the sand in the vicinity of the nest, suggesting that rainbow snakes hatch in the fall, spend the winter on land, and then enter water for the first time in the spring (Gibbons et al., 1977).

The amount of parental investment is unknown. Female *Farancia abacura*, the most closely related species to the *Farancia erytrogramma*, remain coiled around the eggs after laying them (Riemer, 1957). The length of nest attendance is unknown and this behavior has not been observed in *Farancia erytrogramma* However, based on the many other similarities between the species, Neill (1964) raised the possibility that rainbow snakes might also attend their nests. Mitchell (1994, p. 212) states, "Females remain with their eggs in the nest, presumably to confer some protection from predators," but gives no basis for this assertion.

Food Habits

Adult rainbow snakes feed primarily on American eels. The diet preferences of rainbow snakes help to explain their habitat and environmental restrictions (Richmond, 1945). American eels, a catadromous species, are largely restricted to streams, lakes, and occasionally found in isolated swamps or ponds. Rainbow snakes are most commonly observed eating during diurnal hours among the exposed roots of a bald cypress or under streamside shrubs; however, Neill (1964) states that they are more active at night.

Neill (1964) reported watching rainbow snakes travel along the bottom of a clear body of water at a depth of 3 m or more looking for prey. At times they would slowly rise to the surface for air and then return to the bottom. Carr (1940) likewise mentioned seeing what he thought was a rainbow snake at the bottom of a spring 4.5 m deep. When they capture an eel, rainbow snakes exit the water and find a suitable place to consume their prey (Richmond, 1945) and begin consuming the eel head-first. Neill (1964) stated that rainbow snakes may often begin swallowing rapidly, but that it is not uncommon for a snake to slow down and rest with the eel's tail hanging out of its mouth. Haltom (1931) reported that two out of three rainbow snakes he had caught in Tuscaloosa County, Alabama, "had fish in the mouth, thus making the catch very easy."

Juvenile rainbow snakes have not been observed feeding in the wild. However, Neill (1964) reported on a personal communication from Dr. Walter Auffenberg, who had studied feeding behavior in an individual measuring 293 mm in length. On multiple occasions, he observed the young rainbow snake burrow a tunnel in the shape of either a U or P in the sand. The opening of the tunnel was located just below water level. The juvenile rainbow snake sat in the tunnel with its snout barely poking out of the opening and as a river frog (*Rana heckscheri*) tadpole swam by the opening, the snake grabbed the larva and pulled it into its hole to eat. Auffenberg noted the young snake would not eat fishes or salamanders. Rothman (1959) reported that rainbow snakes can be persuaded to eat larvae of *Eurycea* spp. and *Desmognathus* spp. and juvenile northern leopard frogs (*Rana pipiens*) and *Plethodon* spp.

Predation

Richmond (1945) three times observed *Farancia e. erytrogramma* being preyed upon by red-tailed hawks and also documented a rainbow snake that had been eaten by an eastern indigo snake. Ernst and Ernst (2003) list as predators of rainbow snakes bullfrogs, indigo snakes, common kingsnakes, hawks and otters. They also state that raccoons and skunks are known to raid nests and eat the eggs and hatchlings.

Vulnerability and Threats

Habitat loss and the alteration of lakes, streams, rivers and other bodies of water by humans threaten *Farancia erytrogramma*. The alteration of river ecosystems by dams is a barrier for American eels when they are migrating upstream. Since American eels are the primary prey of rainbow snakes, dams are a threat because rainbow snakes' primary food source can no longer reach the rivers and other bodies of water in which rainbow snakes live. Another threat to all snakes, especially those of considerable size, is unnecessary persecution by humans.

Rainbow snakes, whether captive or wild, are frequently parasitized. The dissection of two individuals revealed a heavy infestation of two species of nematodes. One species measured 3–5 mm in length and was found throughout the esophagus and trachea in all of the mesenteries and connective tissue. The second species had a length of 50 mm and was coiled throughout the lining of the stomach and extended by way of an ulcer into the lumen of the stomach. The linings of both specimens' stomachs were covered in ulcers (Richmond, 1945).

Also according to Richmond (1945) the lesions that often appear as small bumps all over the bodies of captive rainbow snakes are caused by large, round parasitic worms in the family Dracunculidae. The worms live below the epidermis and their larvae produce the lesions, through which they are eventually excreted.

Future Studies

Farancia erytrogramma are so uncommonly encountered that very little research has been conducted to study their natural history. It is likely that the perceived rarity of rainbow snakes can be attributed to the lack of successful techniques for capturing the species. Methods for capturing the species must be developed in order to determine population sizes, abundance, habitat preference and seasonal activity.

More research should be conducted on *Farancia e. seminola*. Once a successful technique for capturing the snakes is found, a considerable amount of time should be spent trying to find individuals and determine the population size. To conduct research at Fisheating Creek W.M.A., one must obtain a collection permit from the F.F.W.C.C. and then dedicate a significant amount of time to setting traps baited with eel, installing drift fences lined with snake traps that are baited with eel, and checking them periodically (Enge, pers. com.).

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What Can Brown Do for You? The Domestic and Global Shipping of Myrtle Turtles

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In the mid 1970s the U.S. Food and Drug Administration banned the U.S. sales of turtles under four inches because they found that pet turtles often transmitted salmonella to small children. This was at first devastating to the turtle farmers. Their solution was overseas sales, and finding markets in the U.S. in states where the regulations were not well enforced.

The cost of overseas export of red-eared sliders, *Trachemys scripta elegans*, decreased considerably when UPS took over the shipping. By using UPS, turtle farms in the southeastern United States found they were able to save considerable amounts of money. Other carriers forwarding the hatchling turtles to foreign markets required middle-men, custom clearance and brokers for export. UPS guaranteed exports from Louisiana direct to destinations as far away as Guangzhou, China, in 72 hours and they eliminated the unnecessary fees.

According to a cover story in their in-house trade magazine (Anonymous, 2002), in 2001 UPS began shipping "baby" turtles to overseas markets. At the time the article was written they had just discovered how lucrative the turtle shipping business was and they were developing new sales leads with a number of Louisiana turtle farms. The UPS driver who discovered the potential for turtle shipments pointed out that this was a lot of previously untapped business for UPS. The article goes on to say that there were 59 turtle farms in Louisiana that annually export 12 million hatchlings each year. Jesse Evans, the founder of a central Louisiana turtle farm started in 1968, reported that his farm was among the largest of turtle farms in the world. He was quoted to say "We raise more than two million hatchlings every year and rely on UPS to export almost all of them to China. We do the bulk of our business through distributors in Europe and Asia, but China is our largest market." At the time Evans's 52-acre farm had 14 individual breeding ponds and at the season's peak up to 25,000 eggs were gathered by hand each day.

Just eight years previously the number of exported red-eared sliders was far less. Between 1989 through mid-1994 the average number of hatchling sliders exported was about 4.7 million individuals/year, and their average retail price was 67 cents per turtle (HSUS, 1994). This was an annual business exceeding $3.2 million a year, impressive but still far less that the 2001 annual figure for just Louisiana. The U.S. Fish and Wildlife Service (2006) reported that between 1998 and 2003 the average number of red-eared sliders exported was 8.71 million (in that another 3.2 million hatchling turtles are exported under species codes for *Pseudemys*, including animals identified as *Pseudemys scripta*, easily another million sliders could be added to this total). Whatever the figure, red-eared sliders are recognized as the single biggest component of our country's export live animal wildlife trade. So what happened in this 14-year period? It is worth putting this into perspective. In the post World War II prosperity and suburbanization of America the market for store purchased pet turtles exploded, they were for sale in nearly every pet store in the country as well as in many of the nation's five-and-dime stores. By the 1960s turtle farms were shipping ten million turtles a year within the U.S. and exporting another three million to Canada (Warwick and Holford [1984] cited in HSUS, 1994). Part of the sales volume resulted from the lack of information on the turtles care, as probably few survived the first six months. They were disposable pets, and families simply replaced them with "fresh" ones. A few pet shops even turned this into a sales gimmick. In the 1950s an Iowa based store marketed the sliders as "midget turtles" that lived only six months and never grew (HSUS, 1994). In the mid-1970s hundreds of U.S. turtle farms closed when the U.S. Food and Drug Administration banned the sales of all turtles under four inches. A number of states simply banned the sales of turtles altogether. The turtle farms that survived turned to overseas sales. By the early 1990s South Korea imported over 1.3 million sliders a year and Italy and Japan were buying over half a million hatchlings per year from the U.S. turtle farms.

As recently as the 1980s China's large-scale turtle farms were almost exclusively raising Chinese softshells, *Pelodiscus sinensis* (Shi et al., 2004) and the number of turtle farms continued to subsequently increase. As the softshell market became saturated the operations turned to other turtles, particularly hard-shelled ones (Shi and Parham, 2001; Chen et al., 2000). The market went in two directions -- the more valuable native species and inexpensive imports such as red-eared sliders. At first the sliders were simply purchased from the U.S. as hatchlings and raised to a marketable size. By 2003 the Chinese farms had started their own massive breeding programs for the sliders. In the early years the quantities produced were small as there were relatively few adult sliders in the country, but production increased rapidly. Today the numbers of sliders produced are impressive. By 2010 Chinese turtle farms in five provinces produced as many as 50 million red-eared sliders in a single year (Wang and Yang, 2009). This was up from 20 million in 2005 (Wu and Zeng, 2007). Red-eared sliders accounted for one-third of the turtles produced in Hainan Province (Li, 2008). In addition to the farms' annual output, several million red-eared sliders continued to be imported from the U.S. each year, but this was down from 6–8 million imports in 2005 (Wu and Zeng, 2007). China began purchasing fewer sliders each year as they built up their breeding stock. In fact, they are now probably competing with U.S. farms, exporting pet turtles to various countries lacking appropriate import regulations. In the 1980s to early 1990s the Chinese were purchasing hatchlings for over one U.S. dollar each. With successful breeding in China the price dropped quickly (it's currently about 20 cents) as the country's demand for imported sliders decreased (Liao and Lee, in press).

The market in China is huge. Not only are the sliders mar-

keted as pets, but they are also used in Chinese traditional medicine, as health food supplements, and in cultural rituals. Because they can be obtained inexpensively, imported sliders have become a common substitute for the rarer species formerly used in various forms of traditional medicine and food supplements (Lee and Liao, in press). Merchants typically fail to inform customers the identity of the turtle parts they are selling, as most people do not recognize non-native turtles as possessing effective medical properties. From just the food aspect, today red-eared sliders are available in nearly every supermarket in China.

Okay, so by 2010 the fun starts. With China now producing vast numbers of sliders from the seed stock they purchased 8 to 15 years previously, not only have the overseas sales of the U.S. turtle farms declined, but many of the new farms that took out major bank loans to start up production to meet the seemingly bottomless demand from China have now gone out of business. Because of the very different economic conditions, China can continue to produce hatchling sliders at a much lower cost than the U.S. farms. As a result Chinese farms are now able to control the world market, and the U.S. businesses are losing the international market they developed several decades earlier. Adding to the problems facing U.S. turtle farms, some states such as Florida have banned even the ownership of hatchling red-eared sliders. Furthermore many European countries, and several Asian ones, no longer permit their import (Lee, 2010). Nevertheless, the turtles in the southeastern turtle farms continued to reproduce, and with export markets disappearing, and the domestic market essentially closed by the Food and Drug Administration's regulations, new domestic marketing techniques needed to be developed.

The agencies of various states enforce the federal regulations differently, allowing the turtle farmers still to ship their products to certain markets. While many retail pet stores are reluctant to sell hatchling turtles, independent street venders, mall-placed kiosks, stores for tourists, and others often are willing to market them—even in areas where the regulations are sometimes enforced. For example, in late May and early June 2009, a total of 96 hatchling red-eared sliders were confiscated from two street vendors who were illegally selling the sliders on the streets of Baltimore (Fisher, 2009). An officer of the Maryland Natural Resources Police explained to a reporter that this is an ongoing problem. In 2011 another 150 red-eared sliders were confiscated from Baltimore street venders, and the D.C. Animal Rescue confiscated 100 in the same year. Baltimore, of course, is not the only city to have street venders selling illegal pet turtles to the public. In addition to illegal turtles sold by Baltimore and D.C. vendors, in recent years over 1,000 hatchling red-eared sliders were confiscated in Oregon in 2008, and 200 hatchling sliders were confiscated from five beach wear tourist stores in Myrtle Beach, South Carolina, in 2004 (Anonymous, 2004; Klepper, 2004). Health officials in Philadelphia, Pennsylvania, issued a health warning in October 2008 when salmonella cases spiked in the city from street vendors selling hatchling sliders. And these are just examples that received media attention. Let's not overlook direct on-line sales; the trade in wildlife over the Internet has become a huge industry in the last two decades.

Shortly after the '09 Baltimore seizure, the turtles were turned over to a local turtle rescue. Most of the hatchlings had very soft shells, including some that would bend like tissue paper. Despite the fact that the turtles were given proper care after confiscation and they were eating readily, there was 65% mortality among this group of turtles up to six months after confiscation. The remaining turtles grew much slower than would be expected, and over time the mortality reached nearly 100%.

This is becoming an all too common problem with turtles that are mass-produced for the pet trade, and their poor health and lack of vigor is a direct result of a common marketing strategy, in which newly hatched turtles are forced into artificial, refrigerator-induced "hibernation." The practice is inhumane by any standard, and is unfair to the purchaser as well as the animal. The key to understanding the Baltimore confiscation's health issues was the turtles' size. Slider eggs hatch out in July and August. Thus, the turtles being sold on the streets of Baltimore in May were nearly a year old, yet in size they were within the normal range of fresh-out-of-the-egg hatchlings. Their weights told the real story. Newly hatched turtles typically weigh about 8.2 g each, while the weights of these individuals averaged only 12.9 g even after feeding for several weeks after confiscation. With the closing of overseas markets, changing regulations for domestic sales, and the competitive prices of hatchlings exported from China, marketing of the U.S. produced red-eared sliders has become more difficult. The turtle farms, and the distributors of the pet turtles, are overrun with hatchlings by mid-summer, and the market is soon saturated. So tens of thousands of the turtles are piled into waxed boxes and put under refrigeration where humidity levels are much lower than they would be in true hibernation. In the case of the 2009 Baltimore turtles, they were apparently maintained this way, depending on their actual hatch date, for 7–10 months. Many of the turtles seized in Baltimore in 2011 were also ones that had been refrigerated for half a year or more to capitalize on "spring sales." The farms have learned there is an early spring market for the turtles so they hold back their stock until the new orders start to come in.

Even at cool temperatures, when kept out of water for extended periods, the turtles slowly dehydrate. Because they are dormant, mortality is extremely low during refrigeration. Visible health issues are not noticeable until several weeks after they are removed from the refrigerators. By then they are in the hands of retail dealers, in many cases illegal ones, or the customers. Individual turtles can languish for months prior to succumbing to their failing health. The upper and lower shells of all the turtles from this Baltimore seizure were soft, actually mushy, and flexible, unlike the firm shells of healthy turtles of this size class. Under normal conditions in one year, even with several months of natural hibernation, these turtles should have nearly doubled in total mass.

In the mid '90s, I visited a number of the large commercial turtle farms, and needing hatchling sized specimens of various species to photograph, I was given about a half dozen of each of the types of freshwater turtles that were being stored under refrigeration. In nearly every case, even with being fed and kept under ideal conditions, these hatchling died within a few months after they were removed from their cold storage. The few that

managed to hang on did not grow and died within 6–8 months. The physiological damage of long-term dehydration seems to be irreversible.

Turtles shipped soon after hatching have a much better chance of survival, but even then the industry standard includes high shipping mortality as hundreds of hatchlings are packed into boxes that look like they were designed for pizza delivery and sent overnight by UPS. While the IATA has regulations regarding the humane packing and shipping of turtles, these regulations unfortunately apply only to international flights. The freshly hatched turtles are still living off energy reserves absorbed from their egg yolks, and the turtle farmers tell their retail customers that they can go for about five weeks without food. While this is true, with hundreds of thousands of turtles hatched at a single farm, no one is keeping track as to when individual turtles actually hatch, so many of the hatchlings are shipped long after the five-week period. Even under optimum shipping the turtles are stressed. From the commercial aspect, these turtles are just low-end commodities, selling wholesale for 40–50 cents each when purchased in units of several hundred at a time. Carrots on the grocery store shelf get better treatment. The retail distributors can afford the high mortality rates as they are selling the turtles at $10–15 apiece. The thinking is that most of them end up being flushed down a toilet in six months or so anyway, as the retail customers have no idea of their husbandry needs. It's a disposable pet market, and it's a large one. Over 200,000 farmed pet turtles continue to be sold in this country and more than 12 million continue to be shipped to pet markets overseas each year.

In addition to the cold storage of hatchlings, another major ploy of the pet turtle industry is the marketing of so called "salmonella-free" turtles. Turtle farmers began using techniques developed by the poultry industry and they started bathing eggs and hatchlings in everything from Clorox to the antibiotic gentamicin. After the antibiotic treatments the turtles tested clean for salmonella. Yet, "salmonella-free" turtles that had been shipped to Canada were found to have strains of salmonella resistant to gentamicin (D'Aoust et al., 1990). This had the potential to create an additional level to the problem, as this was the very antibiotic used to treat salmonellosis in children, and its use on turtles could quickly turn the disease into an antibiotic resistant one that would become a major health problem. The so-called salmonella-free turtles actually aren't free of the bacteria. Turtles that do not test positive for salmonella under normal conditions, when put under stress, such as shipping, later tested positive (DuPonte et al., 1978). And of course dehydration from being kept for long periods under refrigeration would likewise induce stress. Interestingly, one Wisconsin store owner claimed that his turtles had been certified as salmonella-free and he had certificates to demonstrate this. He paid out-of-pocket to have his 900 turtles tested at the University of Wisconsin saying he would surrender the sliders only if they came back positive. They came back positive. As far as I know only one state, Louisiana, tests and certifies their turtles to be salmonella-free. This same state claims their farmers raise the turtles only for foreign export. Hmmm?

Hitti (2007) reports on the salmonella death of a three-week-old Florida girl in March 2007. A family friend had given her parents a small turtle. It was purchased as a pet at a local flea market. Tests by the Centers for Disease Control and Prevention (CDC) showed the strain that killed the girl matched the one found in the turtle. The CDC tracked 15 people with similar strains of the bacteria to the one that killed the girl and found that 80% of them had contact with a pet turtle prior to contracting the disease. A four-year-old Kansas girl was stricken with salmonella from three turtles her mother purchased at a mall while vacationing in Wisconsin (Marchione, 2004). At the time undersized turtles were documented as being sold in at least four Wisconsin counties as well as in Arizona, South Carolina, Florida and Texas.

As many as 250,000 reptile-related salmonella infections were reported each year prior to the mid-1970s FDA regulations prohibiting the sale or distribution of turtles under four inches. About 1.4 million human infections from nontyphoidal salmonella occur annually in the U.S., resulting in about 15,000 hospitalizations and 400 deaths. About 80,000 of these cases are currently related to pet reptiles according to the CDC. Young children, the elderly, and cancer patients and other people with weak immune systems are most vulnerable.

The distribution problem is not just the turtle farms selling their products directly to merchants; middlemen and vendors at flea markets and reptile shows also find this a lucrative business. On 2 May 2008 government agents seized 7,000 undersized turtles and tortoises intended for the pet trade from Strictly Reptiles, Inc. The business received a criminal fine of $5,000 and was placed on two-year probation. The case came about when 1,000 turtles—illegally purchased from Strictly—were found in a tourist souvenir business in Panama City (Anonymous, 2008). Undersized turtles being held for sale, intended for sale, or sold are illegal.

There have even been seizures at reptile shows. Two men were convicted in Illinois for selling undersize turtles at an East Peoria reptile show. One who had over 300 turtles was charged with a felony and was sentenced to a year in prison; the other, guilty of a misdemeanor, was given two years probation (Kravetz, 2008).

In mid-December 2009, U.S. Global Exotics, a distributor of exotic pet turtles and other animals, was raided and 27,000 creatures, over 4,000 of them dead and dying, were seized from their Arlington, Texas, warehouse (Solis, 2009). The reptiles and other animals that were confiscated were taken because of the deplorable conditions in which they were kept. One of the examples cited was boxes of live hatchling sliders intended for the pet market that had sat for weeks unopened on shipping room floors. As part of a rescue effort I received a number of the turtle hatchlings seized from the Global warehouse. All were ones that had been stored for the spring pet market and one by one they all succumbed from organ failure resulting from long-term cold storage.

The owners of the Texas animal warehouse had an interesting defense. They pointed out that they were operating within the standards of the exotic pet industry. One witness for the defense noted a study documenting that often as many as 70% of the

animals die before reaching their ultimate purchaser. Such informative statements, while sad, are unfortunately probably true. Perhaps the oddest aspect of all this is that it is the people who love animals and want to own a little turtle named Myrtle or Shelly that are directly driving this disposable "living dead" pet marketing scheme. Enforcement of the CDC regulations is spotty at best and the turtle farmers are desperate to market their stock.

With China now well into the business of breeding and marketing red-eared sliders, the pollution from sliders that escape, or are released into foreign waters, is only going to escalate further. This has already become a problem in China. In Taiwan, where people do not eat turtles, the sliders now occur in not just natural aquatic systems, but they overrun canals and public fountains, and are quickly displacing native species (Liao and Lee, in press). The red-eared slider is recognized by the IUCN as one of the world's ten most invasive exotic species. It is interesting to note that now even authors writing books on the care of pet red-eared sliders take the effort to explain the problems with the industry, the ecological havoc that released pets create, and the issues faced by turtle rescue groups dealing with the endless number of people who want to be rid of their rapidly growing pets. Smith (2011) does an excellent job of explaining the ongoing, basically unresolved, issues regarding these turtles. To date it is the only TFH turtle book that I would endorse.

If one looks at the total picture as to what has evolved in a period of about 60 years, the mass production of red-eared sliders was at best a short-sighted operation. The long-term global ecological impact alone is unprecedented. There are international issues, health issues, major conservation concerns, humanitarian problems, and all sorts of local, state, federal, and international regulations and laws that continue to be violated because of the mass commercialization of this turtle. The FDA regulations have been in effect for well over 30 years, yet they continue to be circumvented by the pet "baby" turtle farms. Now this rogue industry has shifted from a large one centered in a few southeastern states, to a massive totally unregulated one centered in China. The few individual nations and states having the foresight to clamp down on the importation and sales of these turtles are to be applauded, but unfortunately many of them share drainage basins with less informed governing bodies of neighboring political units, and further expansion of red-eared sliders, and other turtle pet trade species (see Lee, 2010), into aquatic systems is a given. Furthermore, while the red-eared turtle production is referred to as "farming," technically this is not the case as fresh adult wild-caught turtles are constantly added to the breeding stock. These "farms" continue to be a drain on wild native populations.

I don't understand the difficulty in doing something as simple as stopping the domestic and international trade in this species, though the China issue now adds a new, and very big, wrinkle to the equation. Not only has China come into a position to be a major player in the marketing of sliders throughout the world, but the long established U.S. farms are once again having trouble marketing their turtles through legitimate channels and acceptable practices. Perhaps the focus of the conservation community should no longer be directed to our regulatory agencies than have continued to be ineffective in stopping the ongoing contamination of our freshwater communities with this highly invasive species, but in talking directly to the domestic and international shipping companies that are enabling this to continue. Unlike agency personnel, private sector executives are in position to make quick and meaningful decisions. The public relations aspect of these decisions, and their long-term and lasting conservation merits, could far outweigh the relatively minor financial loss to their individual domestic and global slider shipping businesses. And of course if state and federal regulatory agencies were actually serious about enforcing existing laws and shutting down this shameful industry there ARE shipping records. What can "Brown" do for them?

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What You Missed at the November Meeting

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November meetings tend not to be well attended. I'm guessing that many of you don't really care about the business of your society or who gets elected. Some people come for the speakers, some just want the *Bulletin*, and many of us appreciate just mixing with others who share an interest in herps, but most aren't heavily into the politics of this organization. So November's meetings tend to be somewhat sparse because many see them as boring, but this November a large crowd showed, probably because of the speakers.

The stars of the November presentation, from left to right: Karen Furnweger holding Thea Furnweger, Susan Horton, DVM, and Erica Livingston, CVT. All are as nice as they look, including Thea. Photograph by Dick Buchholz.

But the rest of the meeting was actually pretty interesting. Jason Hood, president, opened with the usual business such as the really good herp library you have access to through your membership, the still cheap dues, the need for volunteers to do shows, the board meetings that any member is welcome to attend, and, of course the raffle. Next on the agenda, awards were handed out. Most of us may not be interested in the business side of the organization, but that's what keeps all the functions of your society running, mostly smoothly. Awards are a way of recognizing a few of the individuals who dedicate so much of their time and energy toward that goal. Greg Brim, as sergeant-at-arms, presented the awards and he did an exemplary job of introducing each recipient while explaining the work that each did and giving full credit where credit was due. Andy Malawy finally received recognition for being a treasurer who is organized, detailed, and reliable. Mike Scott has dedicated much time to attending the many shows your society presents. Dick Buchholz also reliably brings animals to many of our shows. Cindy Rampacek has consistently been a solid foundation that we rely on to complete any number of tasks. Even I received an award for being a past president. Uh, actually it was an award for having been president. I don't think the award was for being a past president. Wait. Maybe it was. Maybe they figure that I have more value not being president. Anyway, it was an honor to receive the award.

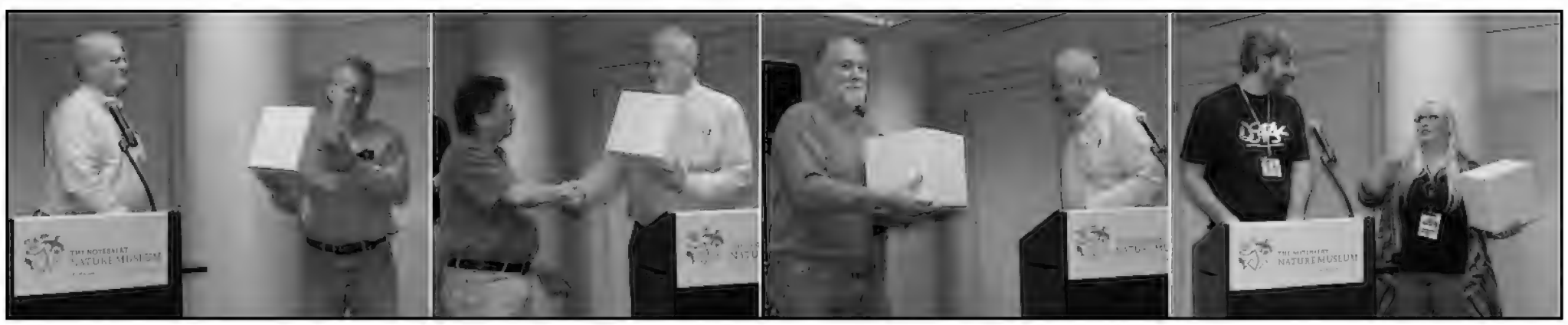
The trouble with awards is you can't recognize everyone who works to keep this society one of the premier herp groups in the country. There are many who deserve recognition who don't get it, and many who deserve it repeatedly, but awards are always compromises between what can be done and what should be done. There is no doubt that each person receiving an award at this meeting deserved the accolades (well, maybe not that past president). Congratulations!

After the awards we went to the speakers. Yeah, that's plural. Three presenters. I don't know how this was arranged, but we had three people speaking about one tortoise. That made for an interesting tale. I only knew one of the presenters so I made a pest of myself and gained a little background on each.

Karen Furnweger has cared for turtles since she was six years old and still owns a box turtle she acquired in 1964. She is a long-time member of the CHS and has worked at the Shedd Aquarium since 1988. Her official title is editor and content manager and not only does she write much of the content of the Shedd's web site, she has also written a book, *Shedd Aquarium; The First Seventy-Five Years*. And she is a very nice person.

Over a year ago Karen acquired a gopher tortoise (*Gopherus polyphemus*) through our adoption program. The previous owner had the tortoise for around 20 years but was not as responsible as Karen; the tortoise had numerous health problems. Karen took the tortoise, named Thea, to Chicago Exotics Animal Hospital in Skokie, Illinois, where Dr. Susan Horton and certified vet technician Erica Livingston became intimately involved with Thea's care.

Dr. Horton opened Chicago Exotics in 2000. She is a member of the Association of Reptile and Amphibian Veterinarians where she chairs the "What's your diagnosis?" section of the journal and the Public Relations, Social Media and Membership



Left to right: Sergeant-at-arms Greg Brim presents CHS Merit Awards to Andy Malawy, Mike Scott and Dick Buchholz; Jason Hood gives Cindy Rampacek her Presidential Service Award. Photographs by Dick Buchholz except for the photo of Dick, which was taken by Barbara Nieri Hood.

Committee. She is also a member of the Association of Avian Veterinarians and the Association of Exotic Mammal Veterinarians. She is an associate editor for the *Journal of Herpetological Medicine and Surgery* and for *Exotic DVM* magazine and a member of the Turtle Survival Alliance. She has worked with the Brookfield Zoo, the Shedd Aquarium and the Illinois Department of Natural Resources. And she is a very nice person.

Erica Livingston has worked at Chicago Exotics for five years, is a certified vet tech working on an avian and exotic specialty and has recently begun a reptile rescue called Friends of Scales. She writes many of the animal care sheets for Chicago Exotics. And she is a very nice person.

Why do all the speakers we have make me feel indolent? And I'm not even a nice person. All three of these people graciously agreed to give a presentation about Thea's diagnosis, treatment and care. The concept was different from what I had experienced, the prospect was intriguing, and the results were gratifying.

Erica began with a presentation titled "Gopher Tortoise Husbandry 101 and Prevention of Bladder Stones (. . . it's exciting!)." The subtitle had me anticipating Erica's sense of humor and her enthusiastic presentation did not disappoint, though exciting may be too strong a term to apply to bladder stones. She started by describing gopher tortoises. They are 10–16 inches long with a flattened carapace and dark green, brown or black without significant markings. Males are larger than females, with more concave plastrons and larger gular projections. Their front legs are longer and less elephantine than the rear legs that are used mainly for support when the animal is burrowing. Aaaaahs emanated from the audience as a full-frontal tortoise close-up filled the screen. Erica covered the natural history of the tortoises. They range throughout the southeastern U.S. from South Carolina through Louisiana, though most populations are in decline. As burrowing animals they love sandy soil in which they dig long deep burrows. Outdoors is the best place to keep them and even in our northern climate they can be outside for much of the year. Outdoor enclosures should have shade, a shallow pool, escape proofing, and predator proofing. Indoor setups should have lots of room to roam, a place to dig, a 90–95°F basking site, a shallow water dish large enough for the tortoise to soak, and proper UVB lighting. No water container should be too deep because gopher tortoises are not good swimmers and can drown in too deep a container.

The tortoises are herbivores that thrive on hay from Bermuda grass or orchard grass and leaves from wild grape as adults but favor greens such as romaine and endive when young. Rinse or soak the greens thoroughly to increase water intake. Commercial tortoise chows can supplement the diet.

Bladder stones or cystic calculi seemed to be the result of incomplete hydration, high protein diets, abnormally high calcium intake, bacterial infections, or a genetic predisposition. Prevention may be aided by soaking foods and tortoise, maintaining a balanced diet high in fiber and low in protein, and minimizing handling so the tortoise does not void its bladder. I still don't think Erica made bladder stones exciting, but she was certainly interesting, enthusiastic and informative.

A runny-eyed, lethargic, very sick tortoise named Thea. Photograph by Dr. Horton.

Dr. Horton stepped to the podium and gave a little background to Thea's specific problems. Her first picture showed a very sick turtle with runny eyes and erosions around her nose, trouble breathing and dehydration. Tests indicated pneumonia and early signs of kidney dysfunction and x-rays showed two enormous bladder stones. Thea's first visit to Dr. Horton was in January, but she was not ready for surgery until September. Thea spent much of the interim in Chicago Exotics Animal Hospital. Susan listed a few factors that a vet considers before doing surgery and a brief tortoise anatomy lesson before she warned us that the surgery pictures were about to start and the squeamish may want to close their eyes. I don't think anyone closed their eyes, but I watched Karen's reaction and realized that this was the first she'd seen pictures of the extensive surgery on her tortoise. Thea's stones were so large that a plastrotomy was the only way to remove them. We were treated to step-by-step photos of the operation, as Thea was anesthetized and cleaned. Then Dr. Horton began cutting through the plastron using a Dremel with a diamond saw blade. She clearly explained the procedures and reasons for each step, moving through the photos with details that had many of us holding our breath about the outcome even though we knew the tortoise was in fine shape. The climax was a photo of two stones about three inches

Cutting into the plastron using a Dremel® with a diamond saw.

Two bladder stones over three inches were removed from Thea. One had eroded completely through the bladder wall and was outside the bladder. Photograph by Dr. Horton.

in diameter, one of which had actually eroded through the bladder wall and was loose in the body cavity! Then Susan showed us the tools used to repair the plastron: fiberglass tape, furniture sliders, and Kevlar® epoxy. That slide was accompanied by laughter from the audience, but the next few as she rebuilt the plastron proved that the materials were a good choice for an animal that takes so long to heal. Susan said some tortoises take up to three years to heal. After the account of Thea's operation, Susan showed a few photos of other procedures performed at Chicago Exotics. From geckos to frogs, Dr. Horton certainly has worked on a variety of herps.

Karen held Thea up to show off the furniture sliders that were epoxied to the plastron after surgery to keep pressure off the healing area. Photograph by Dick Buchholz.

After a few questions, Karen reached into a cooler and brought out the patient. As Thea wandered on the carpet she looked happy and healthy about three months post surgery, and I know that we were happy too. Three nice people giving a very interesting presentation with a happy ending and a tortoise. What's not to like?

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Herpetology 2011

In this column the editorial staff presents short abstracts of herpetological articles we have found of interest. This is not an attempt to summarize all of the research papers being published; it is an attempt to increase the reader's awareness of what herpetologists have been doing and publishing. The editor assumes full responsibility for any errors or misleading statements.

QUEEN SNAKE RESPONSES TO PREY CHEMICALS

S. L. Jackrel and H. K. Reinert [2011, J. Herpetology 45(3): 272-276] note that queen snakes (*Regina septemvittata*) are extreme dietary specialists, feeding nearly exclusively on freshly molted crayfish. To elucidate specific cues that mediate prey detection and foraging behavior in *R. septemvittata*, the authors examined the response of *R. septemvittata* and the dietary generalist *Nerodia s. sipedon*, to chemical compounds produced by crayfish during the molting cycle. Ingestively naive neonate snakes were presented with 20-hydroxyecdysone, ecdysone, methyl farnesoate, ponasterone A, xanthurenic acid, and distilled water. Their response was measured using a modification to the tongue-flick attack score. *Regina septemvittata* exhibited an elevated tongue-flicking response to ecdysone, whereas *N. s. sipedon* exhibited no differential responses to these same arthropod molting chemicals. In a second experiment, *R. septemvittata* showed a twofold higher tongue-flicking response to intermolt crayfish extract that contained ecdysone than to intermolt crayfish extract alone, whereas *N. s. sipedon* demonstrated no differential response between these extracts. In a third experiment consisting of feeding trials, *R. septemvittata* was offered live intermolt crayfish with and without ecdysone. The presence of ecdysone increased the feeding scores of *R. septemvittata*. When ecdysone was present, crayfish were ingested in five of the seven trials, but when ecdysone was absent crayfish were not ingested in any trial. These results suggest that ecdysone may play a critical role in the interaction between *R. septemvittata* and their prey. With numerous stream contaminants known to imitate ecdysone and disrupt the arthropod molting cycle, this finding may have important implications for the conservation of *R. septemvittata*.

BUTTON LOSS IN RIDGE-NOSED RATTLESNAKES

K. Setser et al. [2011, J. Herpetology 45(3):333-335] note that although a keratinous rattle structure at the end of the tail is the defining trait of rattlesnakes, there is variation in the ability of rattles to produce sound. In previously reported cases of reduced rattle functionality, near complete loss of sound production occurs in adult snakes that do not retain loose interlocking rattle segments. The authors report for the first time a distinct phenomenon: the delay in development of a functional rattle among neonate and juvenile ridge-nosed rattlesnakes (*Crotalus willardi*) resulting from universal loss of the rattle button, normally the first loose segment retained in functional rattles. Loose segments added during subsequent sheds are retained at rates similar to two other rattlesnake species examined (based on data from over 1,000 wild-caught rattlesnakes) and presumably other rattlesnakes with sound-producing rattles. This pattern of delayed rattle development results in effectively silent cohorts for approximately the first year of life and provides further insight into the ecological context of rattle function and evolution.

TRAPPING BROWN TREESNAKES

L. C. Mason et al. [2011, J. Herpetology 45(3):308-312] report that current methods for controlling the invasive brown treesnake (*Boiga irregularis*) on Guam include a modified minnow trap with a live mouse lure. The study investigated the effects on capture success of augmenting these traps with scented guide ropes leading to trap entrances. Initial screening of scent preferences was based on time spent in scented and unscented arms of a Y-maze. Preferences of large and small snakes were scored for six different prey scents (live and carrion gecko, skink and mouse). Large snakes spent more time in the maze arm scented with live gecko and carrion gecko; small snakes spent more time in the arm scented with carrion mouse and carrion gecko. After this study, a pilot trapping session was conducted in the field using three treatments (live mouse-scented ropes, carrion gecko-scented ropes, and carrion mouse-scented ropes) and two controls (traps with unscented guide ropes and those with no ropes attached). Contrary to laboratory results, live mouse-scented ropes were most effective. A second trapping session was conducted using live mouse-scented ropes as well as the two controls. For snakes of below-average to average condition, the number of captures for traps with live mouse-scented ropes was higher than for traps with no ropes. However, for snakes of above-average condition, there were no differences in capture rates between trap treatments. Overall, treatment effects were weaker than latent individual heterogeneity and the influence of snake body size, with large snakes trapped more readily.

FORAGING ECOLOGY OF TIMBER RATTLESNAKES

H. K. Reinert et al. [2011, Copeia 2011(3):430-442] examined the diet and foraging behavior of the timber rattlesnake (*Crotalus horridus*) from four separate populations in Pennsylvania and New Jersey. A total of 253 prey items from scat samples, stomach samples, and field observation were identified to species or family level. Although voles (*Myodes gapperi*) and mice (*Peromyscus* spp.) comprised the bulk of the diet in all populations, relative prey species frequency differed significantly among the four populations. These data indicate that the food habits of *C. horridus* varied widely even within relatively small geographic distances. Comparisons with small mammal trapping data further suggest that the diet composition of this ambush predator may not simply reflect the availability of prey species. Radiotelemetric observations of *C. horridus* further indicate differing frequencies of log-oriented foraging behavior among the study sites. Analysis of body posture revealed an alternative ambush foraging posture (non-log-oriented posture) which also exhibited variation in frequency among study sites. However, selected foraging habitats at all study sites were typified by a locally high density of fallen logs and other woody debris (6% of forest-floor cover/m^2). These findings indicate geographic variation in the foraging ecology of *C. horridus* and suggest behavioral plasticity in foraging response to available prey.

Unofficial Minutes of the CHS Board Meeting, November 18, 2011

The meeting was called to order at 7:52 P.M. at the Schaumburg Public Library. Board member Lawrence Huddleston was absent.

Officers' Reports

Recording Secretary: Cindy Rampacek read the minutes of the October 14 board meeting, which were accepted as read.

Treasurer: Andy Malawy shared the financial report from October and they were accepted. We received an additional unexpected allocation from the trust of the late Randilyn L. Scott and our organization is in great financial shape to start the new year.

Vice-president: Based on the assumption that she will be the CHS VP for 2012, Cindy Rampacek has begun lining up speakers: January—Ari Flagle, "Unlocking the Breeding Secrets to the Boelen's Pythons"; February—Mike Pingleton, "Herping in Mexico"; March—Marisa Tellez, no specific topic set but something to do with crocodilians; April—Doug Hotle.

Membership Secretary: Mike Dloogatch read a list of memberships expiring this month.

Sergeant-at-arms: Greg Brim reported that there were 48 people at the October meeting.

Corresponding Secretary: Deb Krohn asked for some suggestions on non-profits she should invite to display at ReptileFest.

Publications Secretary: Aaron LaForge reported no action yet on adding a calendar of events to the website, but with the extra time off next month, he intends to make a lot of progress there.

Committee Reports

Shows:
- Notebaert, first full weekend of each month
- Great Lakes Pet Expo, February 4, 2012
- Reptile Rampage, Lake Forest, March 11
- Family Pet Expo, Arlington Racetrack, March 16–18
- NARBC Tinley Park, March 17 & 18

We expect to have a CHS presence at the Kids Expo in February, but we do not have a date. Jenny Vollman also mentioned that the Emily Oaks Nature Center show went well last weekend and emphasized that thanks were due to Andy Sagan, Ralph Shepstone and Ralph's friend Monica for their participation..

Nominating Committee: Jessica Tschampa will not be present at the November meeting, so another committee member will have to preside over the election. Steve Sullivan's name was suggested.

Awards Committee: Greg Brim reported that the award recipients had been selected and that the awards have been ordered.

New Business

Extra summertime meeting: Jason Hood suggested that the CHS hold an extra general meeting over the summer in a suburban location on a Saturday or Sunday. This would be a normal general meeting with raffle and speaker, but he hopes it will get a different group of members that normally can not make the general meetings because they are midweek and in the city. Jason and Cindy will be moving forward with this idea. Currently they are looking at a date of June 9 or June 16, at the Lake Forest Wildlife Discovery Center if possible.

Promote Bulletin articles: Jason suggested that board members encourage everyone to submit articles to the *Bulletin*. The *Bulletin*, like the CHS, is member-driven. There is a lot going on in private homes that might need documentation or that others can learn from. You do not need to be an expert. Mike Dloogatch is open to all member submissions.

John Archer made a suggestion that we think about reimbursing people who work at our educational shows. There was a lively discussion on both how to or if to reimburse volunteers for the shows, but also how to reach out to new members. And how to get volunteers going and other ways to promote membership.

Round Table

Aaron suggested that we think about moving to an online publication and another lively discussion ensued.

Greg thanked John Archer for starting the biggest debate of the board meetings he has seen.

Mike thinks it is great that we are kicking around new ideas and he shared with people another CARE package from Marcia Rybak—old ReptileFest shirts and a very unusual Australian magazine.

Nancy Kloskowski shared that the rosy boa that Mike adopted had babies last week and 1 was albino.

J.T. Turingan thanked us for letting him come to the board meeting. He is excited to be part of it. He thinks we are all great people and he is here to help out.

Bobby Delaney seconded J.T.'s sentiment. He also wanted to offer his ability with graphics work to the CHS to help bring us into the new century.

Jason got a sweet diamond–jungle cross through the adoptions program.

Aaron mentioned that he has been able to restore the link from the CHS website to Amazon.com

The meeting was adjourned at 9:40 P.M.

Respectfully submitted by recording secretary Cindy Rampacek

Advertisements

For sale: rats and mice—pinkies, fuzzies and adults. Quantity discounts. Please send a SASE for pricelist or call Bill Brant, *THE GOURMET RODENT*, PO Box 430, Newberry, FL 32669-0430, 352-472-9189, E-mail: GrmtRodent@aol.com.

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For sale: This is not a last chance, but it's a good time to buy a copy of *The Golden Age of Rattlesnake Hunting*. Here's what some people have said about it: "May the book receive the hearty enthusiasm it deserves. . . ."—Hobart Smith; "I never knew you got a kick out of catching big ones alive."—Roger Conant; "Buy my dad's book."—Greg Wheeler; "An intriguing book . . "—Bob & Sheri Ashley; "I've read it twice and I'll read it again."—Bill Peterson; "Buy my dad's book."—Don C. Wheeler. If you've decided you've got to have it, send $12 check, cash or money order to Don Wheeler, 2705 Sunset Trail, Riverwoods IL 60015.

For sale: Australian herp publications: G. M. Storr, L. A. Smith and R. E. Johnstone, *Lizards of Western Australia, Volume 1—Skinks*, 1981, 200 pp., *Lizards of Western Australia, Volume 2—Dragons and Monitors*, 1983, 113 pp., *Lizards of Western Australia, Volume 3—Geckos & Pygopods*, 1990, 141 pp., *Snakes of Western Australia*, 1986, 187 pp. All four of these books each have at least 20 color plates with 2 to 8 color photos apiece, drawings, range maps; descriptions, distributions, derivation of scientific names, extensive bibliographies, softbound, $135 for set of four; *A Field Guide to Reptiles of the Australian High Country* by R. Jenkins and R. Bartell, 1980, 278 pp., many excellent color photos, descriptions and biology of the reptiles of the southeastern highlands, DJ, hardbound, $35; "Cane Toads—A warts-and-all encounter with a reviled pest" by Peter Meredith, in Oct./Dec. 1996 issue of *Australian Geographic*, 16 pp. with many color photos, the history, biology and efforts to eradicate this scourge—toad races, too—contained in l28-page issue, $19. All publications are in excellent condition. $3 postage and handling for orders under $25, free for orders over $25. William Turner, 7395 S. Downing Circle West, Centennial CO 80122; (303) 795-5128; toursbyturner@aol.com

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Line ads in this publication are run free for CHS members—$2 per line for nonmembers. Any ad may be refused at the discretion of the Editor. Submit ads to mdloogatch@chicagoherp.org.

ReptileFest 2012

April 14–15

It's creeping up on you

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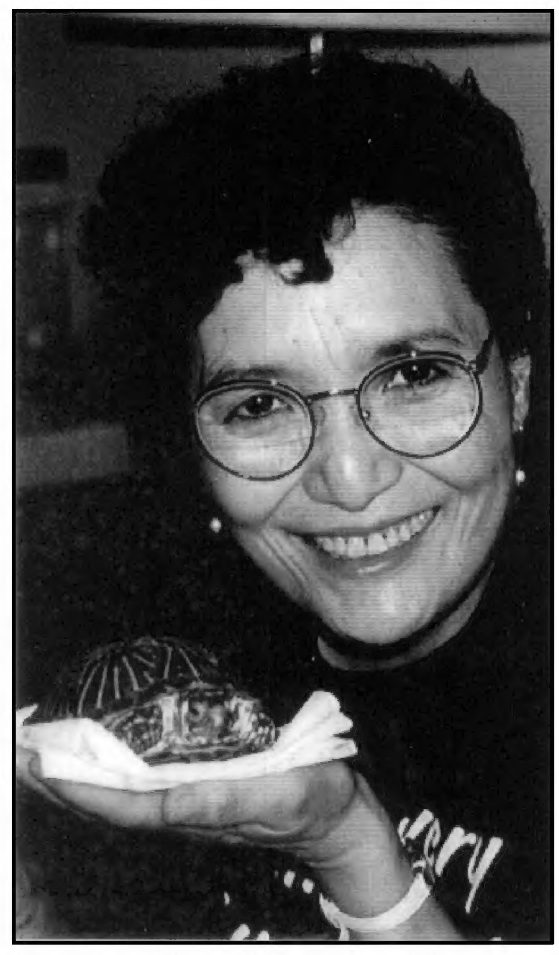
A Thoughtful and Much-appreciated Donation

My mother, Kyunghi "Katie" Tynus, was an avid turtle lover. She took exceptional care of her ornate box turtle, Glynis, for 19 years. At one point, her journey through Glynis, care led her to the Chicago Herpetological Society and she had the pleasure of meeting Chris Lechowicz, who was quite helpful to her.

Sadly, my mother passed away on October 18, 2011, and our family decided to ask the guests at her memorial service to make donations to your Society in lieu of sending flowers. There was a very good response and most of the attendees made their donations directly to my brother and me. We are therefore pleased to enclose two donation checks totalling $500 for the CHS, in her honor. While it would be most fitting to use the money for some purpose related to turtles in particular, we certainly accept it being used in the way deemed most fit by the CHS.

Best regards,

Laura La Rocca



Kyunghi "Katie" Tynus and her beloved ornate box turtle, Glynis.

UPCOMING MEETINGS

The next meeting of the Chicago Herpetological Society will be held at 7:30 P.M., Wednesday, December 30, at the Peggy Notebaert Nature Museum, Cannon Drive and Fullerton Parkway, in Chicago. **This meeting will be a holiday party.** The CHS will provide soft drinks and snacks. If you would like to bring something edible to share with the group, you are invited to do so. If you would like to bring an animal to show off to the group, you are encouraged to do that as well. This will be a chance to socialize all evening and get to know your fellow members a little better.

The speaker at the January 25, 2012, meeting will be **Ari Flagle**, a keeper in the Department of Ectotherms at the Fort Worth Zoo. Ari's topic will be "Unlocking the Secrets to Breeding Boelen's Pythons."

The regular monthly meetings of the Chicago Herpetological Society take place at Chicago's newest museum—the **Peggy Notebaert Nature Museum**. This beautiful building is at Fullerton Parkway and Cannon Drive, directly across Fullerton from the Lincoln Park Zoo. Meetings are held the last Wednesday of each month, from 7:30 P.M. through 9:30 P.M. Parking is free on Cannon Drive. A plethora of CTA buses stop nearby.

Board of Directors Meeting

Are you interested in how the decisions are made that determine how the Chicago Herpetological Society runs? And would you like to have input into those decisions? If so, mark your calendar for the next board meeting, to be held at 7:30 P.M., January 13, in the adult meeting room on the second floor of the Schaumburg Township District Library, 130 S. Roselle Road, Schaumburg..

The Chicago Turtle Club

The monthly meetings of the Chicago Turtle Club are informal; questions, children and animals are welcome. Meetings normally take place at the North Park Village Nature Center, 5801 N. Pulaski, in Chicago. Parking is free. For more info visit the group's Facebook page.

ELECTION RESULTS

As a result of the elections held November 30, 2011, the following officers and members-at-large will serve on the CHS Board of Directors for the year 2012.

President:	Jason Hood	Membership Secretary:	Mike Dloogatch
Vice-president:	Cindy Rampacek	Sergeant-at-arms:	Jim Foster
Treasurer:	Andy Malawy	Members-at-large:	Lawrence Huddleston
Recording Secretary:	Jenny Vollman		Barbara Kahn
Corresponding Secretary:	Deb Krohn		Nancy Kloskowski
Publications Secretary:	Aaron LaForge		Linda Malawy

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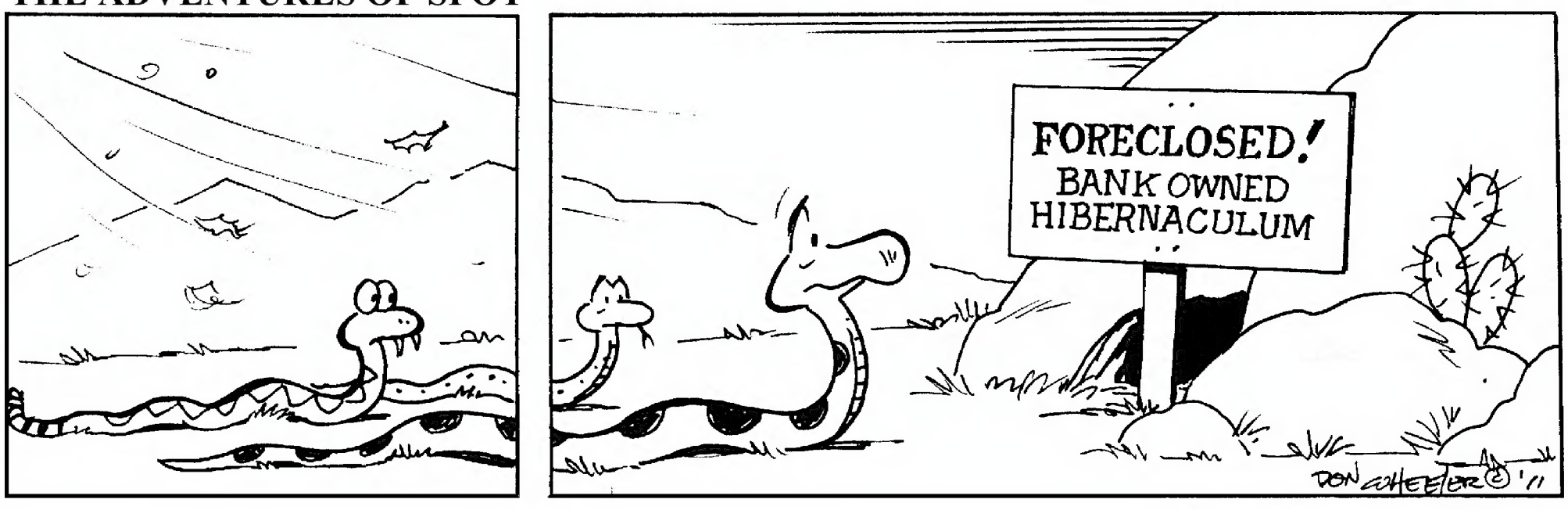

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